4.0 EVALUATION OF ALTERNATIVES

4.1 Alignment Selection Criteria.

The decision on Service Area alternatives is independent of the decision on Alignment Alternatives, and will not affect the alignment selection criteria. The service area alternative will be chosen on the basis of policy and cost implications, while the alignment alternative will be selected on the basis of several engineering, ecological, and cost considerations.

Table 4.1 summarizes the selection criteria used for ranking the alignment options, and provides a rating score for each alternative, in order to provide an overall comparison among the three alignments. A rating scale of 1 to 5 was used for each selection criterion, with "1" being the least favorable and "5" being the most favorable.

Table 4.1 – Alignment Selection Criteria and Ranking

Criteria	Alignment #1	Alignment #2	Alignment #3
Engineering Factors			
Length of total project	4	4	4
Length of bores	5	2	5
Impacts on the BNSF railroad	4	3	4
ROW and Permit requirements	4	2	3
Hydraulic Design	4	5	4
Impacts on existing utilities	3	3	3
Geotechnical considerations **	--	--	--
Construction techniques/constructibility	3	3	5
Ecological Factors			
Impacts on park flora	4	4	2
Impacts on park fauna	4	4	2
Impacts on Salt Creek	5	5	4
Impacts on sandstone formation	3	4	4
Area of construction disturbance	5	5	3
Extent of restoration required	5	5	3
Impacts on other adjacent properties	3	4	4
TOTALS	56	53	50

** The geotechnical considerations need to be detailed in additional studies.

The selection criteria and relative ranking scores indicate that Alignment #1 is the most favored option, followed by Alignment #2, and then Alignment #3. These rankings should be considered in conjunction with a comparison of total project costs for each of the three alternatives. The estimate of project costs for each alternative are summarized on the following pages.

4.2 Engineer's Estimate of Project Costs

The following estimates are divided into two groups of three options each. Options 1A, 1B and 1C are based on the Tier II Service Area, which can be accommodated with a 48-inch diameter pipe. The three alternatives under Option 1 are separated by the BNSF railroad crossing location at Rokeby Road, with Option 1A as the north crossing through the Wilderness Ridge detention cell on the west side, Option 1B as the diagonal crossing, and Option 1C as the south crossing through the woodland area of the park on the east side. Options 2A, 2B, and 2C are based on the Total Ridgeline Service Area, which requires a 54-inch diameter pipe. The three alternatives under Option 2 also differentiate the three railroad crossing options at Rokeby road.

From the individual cost estimates, the difference in project cost from a 48-inch diameter pipe to a 54-inch diameter pipe is in the range of $500,000 to $57,000, depending upon the method of crossing the railroad at Rokeby Road. The cost of Options A and C for each pipe size are nearly identical, with the cost of additional depth through the detention cell in Option A being offset by the cost of Additional park restoration in Option C. In each case for Option B, the long diagonal bore at Rokeby Road was the most expensive alternative. Table 4.2 below gives a summary of the Total Project Cost for each option.

Table 4.2 – Engineer's Estimated Total Project Cost
Alternatives Matrix

Alternatives	North Crossing at Rokeby Road	Diagonal Crossing at Rokeby Road	South Crossing at Rokeby Road
Tier II (48-inch pipe)	1A - $3,576,000	1B - $3,891,000	1C - $3,547,000
Total Ridgeline (54-inch pipe)	2A - $4,080,000	2B - $4,458,000	2C - $4,055,000

In addition to the alternative cost estimates given above, there was some question as to the additional cost of skewing the alignment to the west of the BNSF property line in the "Old Fields" area of Wilderness Park, in order to preserve the stand of mature trees that acts as a buffer strip between this area of the park and the railroad. The additional construction requirements for this route adjustment include 45 feet of additional pipeline length, and 2 additional manholes for deflections in the pipe alignment. The construction cost for these route adjustments are as follows:

48-inch diameter pipe - $ 24,000
54-inch diameter pipe - $ 26,000

The cost of these adjustments is included in the cost estimates given above and detailed on the following pages.

Upper Southeast Salt Creek Trunk Sewer
Preliminary Cost Estimate

Option 1A - Tier II Service Area (48" pipeline) and
Rokeby Road crossing at north end

	ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
	48" sanitary sewer (10'-15' deep)	4,530	LF	$150	$679,500
	48" sanitary sewer (15'-20' deep)	1,700	LF	$200	$340,000
	48" sanitary sewer (20'-25' deep)	1,100	LF	$275	$302,500
	72" diam. manhole (10' deep)	17	Each	$5,000	$85,000
	72" manhole add'l depth	170	VF	$250	$42,500
(North)	72" diam. casing, bored in place	140	LF	$1,100	$154,000
(South)	72" diam. casing, bored in place	140	LF	$1,200	$168,000
	42" diam. pipe stub & plug (10')	2	Each	$1,500	$3,000
	Pipe encasement/stream crossing	75	LF	$2,000	$150,000
	Dewatering (ave. depth = 8')	7,330	LF	$30	$219,900
	Park restoration	575,000	SF	$0.20	$115,000
	Tree replacement	200	Each	$300	$60,000
	SUBTOTAL				$2,319,400
	Contingencies (25%)				$579,850
	Permanent Easements	150,000	SF	$1.00	$150,000
	Temporary Easements	600,000	SF	$0.10	$60,000
	SUBTOTAL				$3,109,250
	Engineering, Legal, Admin. (15%)				$466,388
	TOTAL				**$3,575,638**

Upper Southeast Salt Creek Trunk Sewer
Preliminary Cost Estimate

Option 1B - Tier II Service Area (48" pipeline) and
Rokeby Road diagonal crossing

	ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
	48" sanitary sewer (10'-15' deep)	4,530	LF	$150	$679,500
	48" sanitary sewer (15'-20' deep)	2,000	LF	$200	$400,000
	48" sanitary sewer (20'-25' deep)	800	LF	$275	$220,000
	72" diam. manhole (10' deep)	16	Each	$5,000	$80,000
	72" manhole add'l depth	150	VF	$250	$37,500
(North)	72" diam. casing, bored in place	140	LF	$1,100	$154,000
(South)	72" diam. casing, bored in place	350	LF	$1,200	$420,000
	42" diam. pipe stub & plug (10')	2	Each	$1,500	$3,000
	Pipe encasement/stream crossing	75	LF	$2,000	$150,000
	Dewatering (ave. depth = 8')	7,330	LF	$30	$219,900
	Park restoration	575,000	SF	$0.20	$115,000
	Tree replacement	200	Each	$300	$60,000
	SUBTOTAL				$2,538,900
	Contingencies (25%)				$634,725
	Permanent Easements	150,000	SF	$1.00	$150,000
	Temporary Easements	600,000	SF	$0.10	$60,000
	SUBTOTAL				$3,383,625
	Engineering, Legal, Admin. (15%)				$507,544
	TOTAL				**$3,891,169**

Upper Southeast Salt Creek Trunk Sewer
Preliminary Cost Estimate

Option 1C - Tier II Service Area (48" pipeline) and
Rokeby Road crossing at south end

	ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
	48" sanitary sewer (10'-15' deep)	4,530	LF	$150	$679,500
	48" sanitary sewer (15'-20' deep)	2,300	LF	$200	$460,000
	48" sanitary sewer (20'-25' deep)	500	LF	$275	$137,500
	72" diam. manhole (10' deep)	17	Each	$5,000	$85,000
	72" manhole add'l depth	150	VF	$250	$37,500
(North)	72" diam. casing, bored in place	140	LF	$1,100	$154,000
(South)	72" diam. casing, bored in place	140	LF	$1,200	$168,000
	42" diam. pipe stub & plug (10')	2	Each	$1,500	$3,000
	Pipe encasement/stream crossing	75	LF	$2,000	$150,000
	Dewatering (ave. depth = 8')	7,330	LF	$30	$219,900
	Park restoration	575,000	SF	$0.20	$115,000
	Tree replacement	300	Each	$300	$90,000
	SUBTOTAL				$2,299,400
	Contingencies (25%)				$574,850
	Permanent Easements	150,000	SF	$1.00	$150,000
	Temporary Easements	600,000	SF	$0.10	$60,000
	SUBTOTAL				$3,084,250
	Engineering, Legal, Admin. (15%)				$462,638
	TOTAL				**$3,546,888**

Upper Southeast Salt Creek Trunk Sewer
Preliminary Cost Estimate

Option 2A - Total Ridgeline Service Area (54" pipeline) and
Rokeby Road crossing at north end

	ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
	54" sanitary sewer (10'-15' deep)	4,530	LF	$190	$860,700
	54" sanitary sewer (15'-20' deep)	1,700	LF	$245	$416,500
	54" sanitary sewer (20'-25' deep)	1,100	LF	$315	$346,500
	72" diam. manhole (10' deep)	17	Each	$5,000	$85,000
	72" manhole add'l depth	170	VF	$250	$42,500
(North)	78" diam. casing, bored in place	140	LF	$1,250	$175,000
(South)	78" diam. casing, bored in place	140	LF	$1,400	$196,000
	42" diam. pipe stub & plug (10')	2	Each	$1,500	$3,000
	Pipe encasement/stream crossing	75	LF	$2,000	$150,000
	Dewatering (ave. depth = 8')	7,330	LF	$30	$219,900
	Park restoration	575,000	SF	$0.20	$115,000
	Tree replacement	200	Each	$300	$60,000
	SUBTOTAL				$2,670,100
	Contingencies (25%)				$667,525
	Permanent Easements	150,000	SF	$1.00	$150,000
	Temporary Easements	600,000	SF	$0.10	$60,000
	SUBTOTAL				$3,547,625
	Engineering, Legal, Admin. (15%)				$532,144
	TOTAL				**$4,079,769**

Upper Southeast Salt Creek Trunk Sewer
Preliminary Cost Estimate

Option 2B - Total Ridgeline Service Area (54" pipeline) and
Rokeby Road diagonal crossing

	ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
	54" sanitary sewer (10'-15' deep)	4,530	LF	$190	$860,700
	54" sanitary sewer (15'-20' deep)	2,000	LF	$245	$490,000
	54" sanitary sewer (20'-25' deep)	800	LF	$315	$252,000
	72" diam. manhole (10' deep)	16	Each	$5,000	$80,000
	72" manhole add'l depth	150	VF	$250	$37,500
(North)	78" diam. casing, bored in place	140	LF	$1,250	$175,000
(South)	78" diam. casing, bored in place	350	LF	$1,400	$490,000
	42" diam. pipe stub & plug (10')	2	Each	$1,500	$3,000
	Pipe encasement/stream crossing	75	LF	$2,000	$150,000
	Dewatering (ave. depth = 8')	7,330	LF	$30	$219,900
	Park restoration	575,000	SF	$0.20	$115,000
	Tree replacement	200	Each	$300	$60,000
	SUBTOTAL				$2,933,100
	Contingencies (25%)				$733,275
	Permanent Easements	150,000	SF	$1.00	$150,000
	Temporary Easements	600,000	SF	$0.10	$60,000
	SUBTOTAL				$3,876,375
	Engineering, Legal, Admin. (15%)				$581,456
	TOTAL				**$4,457,831**

Upper Southeast Salt Creek Trunk Sewer
Preliminary Cost Estimate

Option 2C - Total Ridgeline Service Area (54" pipeline) and
Rokeby Road crossing at south end

	ITEM	QUANTITY	UNITS	UNIT COST	TOTAL COST
	54" sanitary sewer (10'-15' deep)	4,530	LF	$190	$860,700
	54" sanitary sewer (15'-20' deep)	2,300	LF	$245	$563,500
	54" sanitary sewer (20'-25' deep)	500	LF	$315	$157,500
	72" diam. manhole (10' deep)	17	Each	$5,000	$85,000
	72" manhole add'l depth	150	VF	$250	$37,500
(North)	78" diam. casing, bored in place	140	LF	$1,250	$175,000
(South)	78" diam. casing, bored in place	140	LF	$1,400	$196,000
	42" diam. pipe stub & plug (10')	2	Each	$1,500	$3,000
	Pipe encasement/stream crossing	75	LF	$2,000	$150,000
	Dewatering (ave. depth = 8')	7,330	LF	$30	$219,900
	Park restoration	575,000	SF	$0.20	$115,000
	Tree replacement	300	Each	$300	$90,000
	SUBTOTAL				$2,653,100
	Contingencies (25%)				$663,275
	Permanent Easements	150,000	SF	$1.00	$150,000
	Temporary Easements	600,000	SF	$0.10	$60,000
	SUBTOTAL				$3,526,375
	Engineering, Legal, Admin. (15%)				$528,956
	TOTAL				**$4,055,331**